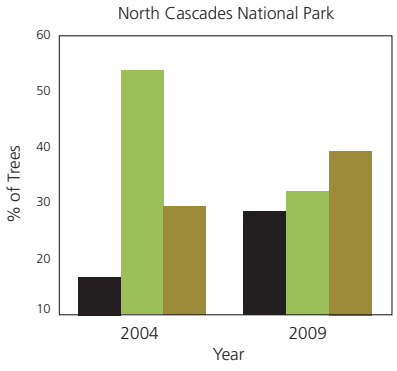
Whitebark Pine
Resource Brief

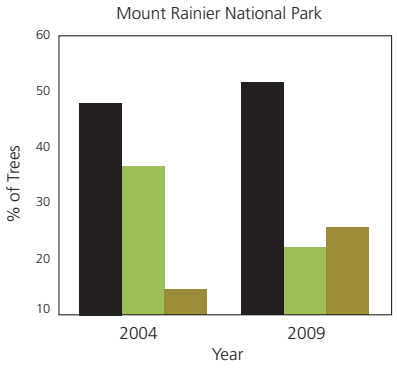
National Park Service
U.S. Department of the Interior

Mount Rainier, North Cascades, Olympic

LEFT Dead whitebark pine among subalpine fir in North Cascades National Park. NPS

RIGHT White pine blister rust enters the tree through the needles and then travels down to the branches. As the fungus fruits, cankers develop causing the stem to swell and the bark to become rough and broken. NPS





Dead Uninfected Blister Rust

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Importance

Whitebark pine (*Pinus albicaulis*) grows in three mountain parks within the North Coast and Cascades Network (NCCN). Often the first tree species to establish in subalpine meadows or alpine ridges, it influences snowmelt patterns, soil development, and provides important micro-sites for establishment of other plants. Whitebark pine seeds are a valuable food for birds, squirrels, and bears. Clark's nutcrackers (*Nucifraga columbiana*), red squirrels (*Tamiasciurus hudsonicus*) and Douglas squirrels ((*Tamiasciurus douglasii*) extract seeds from the closed cones and then cache them in subalpine meadows for future retrieval.

Whitebark pine grows on cold, dry sites above 5,000' (1524 m) on the east side of North Cascades National Park (NOCA) and the northeast corner of Mount Rainier National Park (MORA). Small, disjunct populations are found on the west sides of both parks. In Olympic National Park (OLYM), whitebark pine is limited to three populations east of Mount Olympus and trees are often found in a clumped formation where individuals are difficult to distinguish.

Status

Today, white pine blister rust (*Cronartium ribicola*) and mountain pine beetles (*Dendroctonus ponderosae*) threaten the long-term survival of whitebark pine. Blister rust is a Eurasian fungus that was introduced to North America in 1910. Long-term monitoring of whitebark pine was initiated in Mount Rainier and North Cascades National Parks in 2004. Whitebark pines were tagged in permanent plots allowing park scientists to document changes in tree growth, rates of blister rust infection, mortality, and presence of mountain pine beetles.

Evaluation of long-term plots in 2009 revealed disappointing trends in mortality and infection rates. In MORA, the proportion of uninfected trees (>2.54 cm diameter at breast height, dbh) decreased from 37% to 22% while infections rates rose from 15% to 26% and mortality increased from 48% to 52%. In NOCA, the proportion of uninfected trees decreased from 54% to 32% and infection rates increased from 29% to 39% while mortality increased from 17% to 29%. Infection rates in saplings (individuals taller than 50 cm but <2.54 cm dbh) increased in both parks (25% to 43% in MORA and 17% to 21% in NOCA), although live sapling density remained stable. Incidence of mountain pine beetle was fairly low in each park (3% of sites in NOCA and < 1% of sites in MORA).

Discussion

NCCN scientists recently collaborated with US Forest Service geneticists to describe patterns of genetic diversity in whitebark pine across Washington and Oregon. In addition, they are also screening populations to quantify levels of genetic resistance to blister rust. In 2007, initial results of the genetic resistance screening indicated that seedlings grown from Mount Rainier parent trees have the highest levels of rust resistance of any seed source in the Pacific Northwest, as tested by the US Forest Service. Results of research and monitoring will be utilized to develop site specific restoration and climate adaptation strategies.